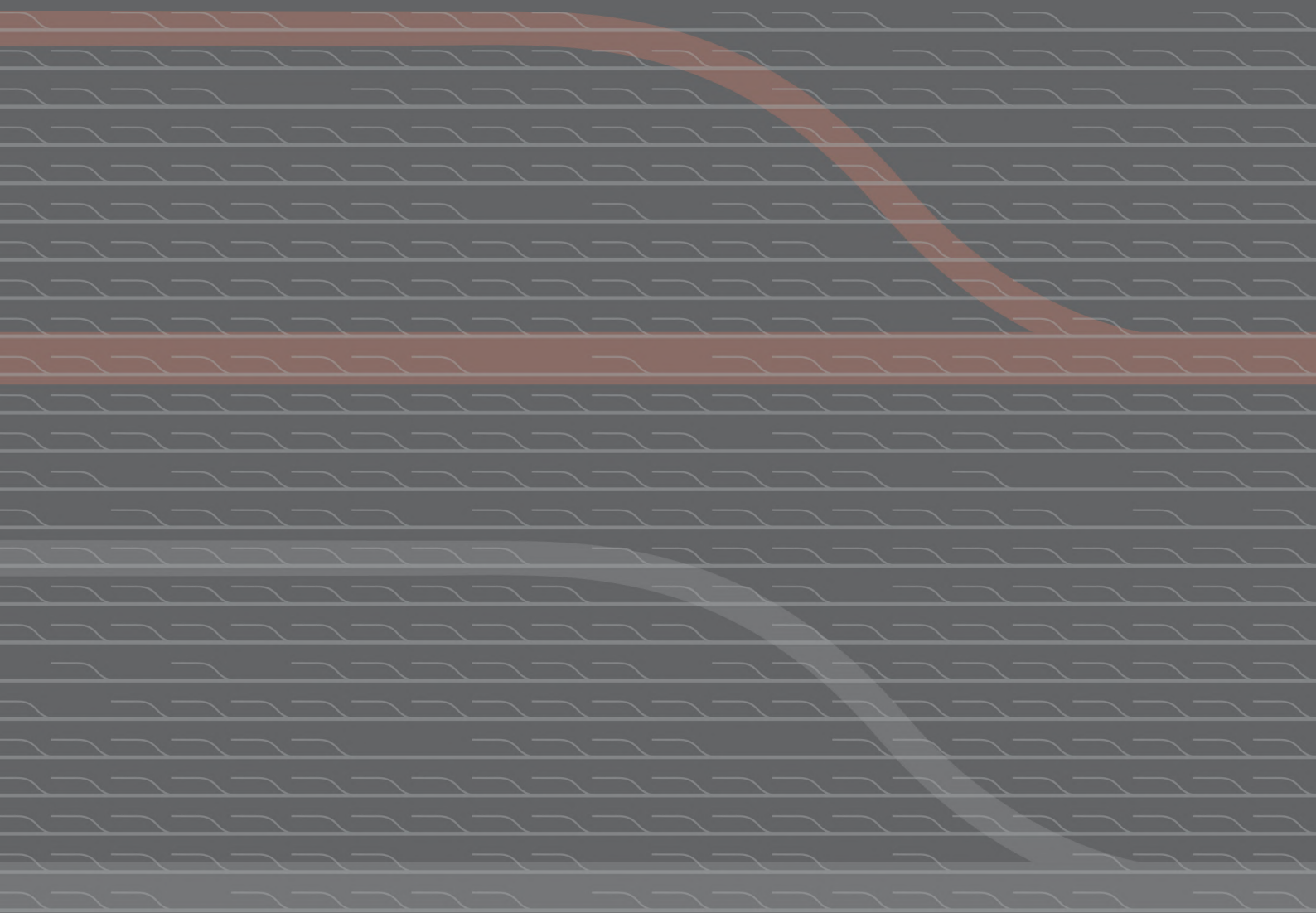


railway, metro & LRT | product sheets



conventional turnouts

Turnouts installed in the track enable passing of the vehicle in either straight or branch direction. Depending on the design we distinguish the following types of turnout constructions:

- o Single turnout
- o Curved turnout
- o Equal slip
- o Symmetrical turnout
- o Diamond crossing
- o Double slip
- o Single slip
- o Crossover
- o Double crossover
- o Rail expansion joint



Turnouts are designed for different rail profiles (e.g. UIC60, S49, R65) and they may be placed onto wooden, concrete or plastic sleepers. The standard gauge is 1435 mm. The superstructure including fastening systems, gauge, type of sleepers and requested geometrical layout is modified according to customers' requirements.

Technical description

Switch panel

- Consists of stock rails, switch rails (quality R260), slide chairs, base plates in the switch heel, switch rail studs, anti-creed lock.
- The drilling in the switch rail is performed depending on the locking device.

Closure panel

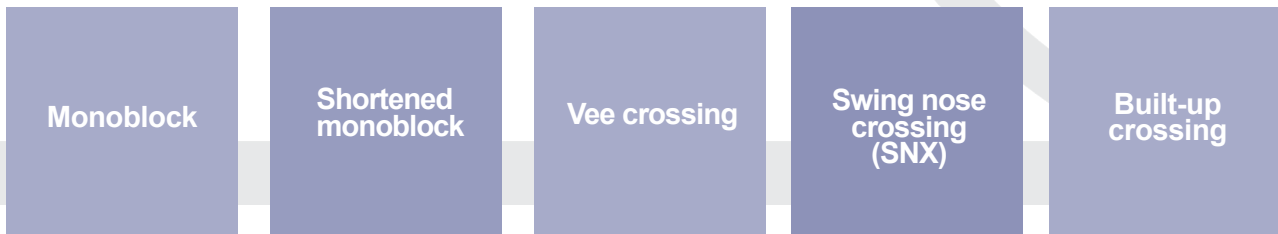
- The rails may be equipped with glued insulated joints

Crossing panel

- Consists of crossing, running rail, check rail and base plate



Crossing may be of following types:

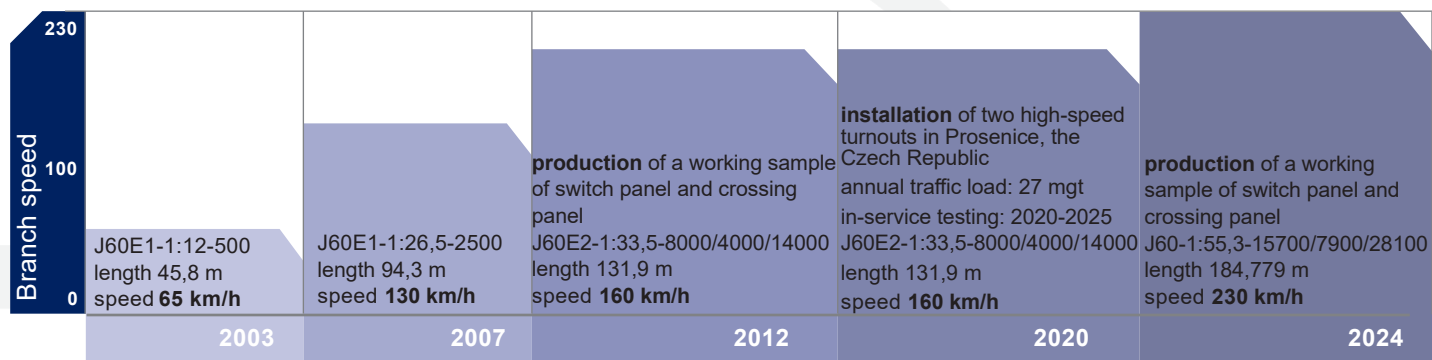


Turnouts are suitable for both continuous welded track and jointed track. Standard axle load is 22,5 t, running rails are of quality R260 or 350HT, check rails are of profile 33C1.

high-speed turnouts

| | In-service testing | In preparation | |
|-----------------------|---------------------------------|------------------------------|------------------------------|
| Technical description | Geometry (basic) | 1:33,5 | 1:55,3 |
| | Radius in a branch direction | 8000/4000/14000 | 15700/7900/28100 |
| | Constructional length | 131,910 m | 184,779 m |
| | Max speed in straight direction | 350 km/h | According to track speed |
| | Max branch speed | 160 km/h | 230 km/h |
| | Rail profile | 60E2 | 60E2 |
| | Bearers | Concrete | Concrete |
| | Fastening | Tension clamp Vossloh Skl 24 | Tension clamp Vossloh Skl 24 |
| | Hydraulic point machine | DTZ 6/3 | DTZ 8/4 |

Development of high-speed turnouts with SNX



Switch panel



Crossing panel

heavy-duty turnouts

Technical description

Switch panel

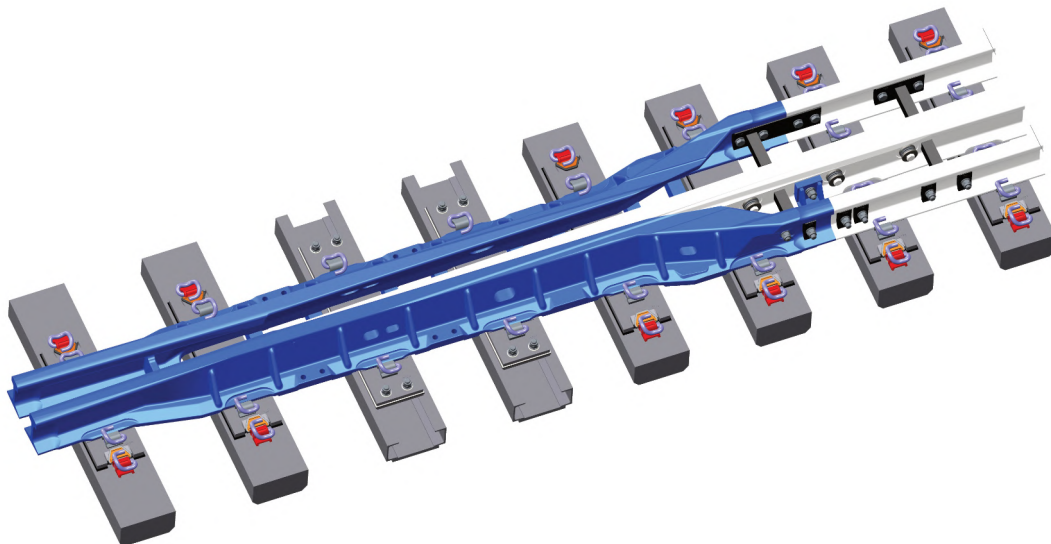
Stock rails of profile AREA 136RE, hardness 370 HB, switch rails of AREA 136-TW, hardness 343 HB, rail jaws and integrated roller chairs.

Fixed crossings

Manganese steel casting EDH (min 350 HB), continuing profile AREA136RE.

Swing nose crossing

Rail profile – AREA136RE, hardness 370 HB, tip assembled of rails AREA136-TW, hardness 343 HB, crossing frame: manganese steel casting EDH, rail expansion device is designed with sliding insert between the main tip and the side tip at the front.



Use

- Heavy duty operations
- Mines
- Metallurgical plants
- Freight terminals

Benefits

- Compact design
- Axle load up to 48 tons

industrial turnouts

Technical description

The switch consists of the welds of half set of switches with slide chairs which are spaced apart by gauge bars. Switch rails are made from standard R65 rails which is forged and welded using spacers to ensure the perfect alignment with connecting grooved rail. The switch is fitted with switch rail studs so as to withstand the centrifugal forces. The switch may be equipped with heating.

The crossing consists of a block with welded connecting rails. The check rails are milled to match the flange profile of 57R1 rail and is held in place with fitted liner bolts. The check rails create a groove narrow enough to guide the wheel flange past the tip of the crossing. The turnouts is suitable for fixing onto wooden or concrete sleepers or onto a concrete slab. Operation of the switch rails into the desired position is achieved by use of manual point machine.

This turnout is designed for axle load up to 25 t. The design of the turnout was adjusted to the standard geometry of the turnout 1:7,5 R=190m and rail profile 57R1, however, the geometry or the rail profile is variable.



Use

- Industrial railway siding
- Ports
- Logistic centres
- Freight terminals

Benefits

- Road vehicle transport across the track is permitted

fixed crossings

BUILT-UP CROSSING

Common crossing with point rail and splice rail manufactured from vignole rail or special crossing rails (S 49). The point rails and the wing rails are of quality R260. Connecting rails may be welded to the points. The wing rails are manufactured from vignole rails and are connected to the point rails with high-strength bolts or HT bolts. The wing rails and crossing vee running surfaces may be heat-treated in the area of the wheel passage from the wing rail to the crossing vee and vice versa. The crossing is placed on ribbed base plates fixed usually with standard rail clips.

Benefits & Use

- Low price (economical also when small number of pieces is manufactured)
- Suitable for tracks of low operation load (siding tracks, regional lines)
- Model device is not required



CROSSING WITH HARDENED FORGED NOSE

Common crossing with forged heat-treated nose, raised forged wing rails are heat-treated in the area of wheel passage from the wing rail to the crossing vee. The wing rail may be designed without the raised part, heat-treated in the area of wheel passage. The wing rails are connected to the hardened forged nose with HT bolts. The contact patches are ballast-glued. The crossing is placed on base plates fixed with elastic clamps or elastic clips.

Benefits & Use

- Suitable for tracks of medium operation load (main tracks)
- Model device is not required, economical also when small number of pieces is manufactured



fixed crossings

MONOBLOCK CROSSING - MANGANESE STEEL

Common crossing with monoblock casting flash-butt welded with connecting rails by means of CrNi insert piece. The casting is from manganese steel. The connecting rails are of Vignole rails of quality R260 or higher. The crossing is placed on ribbed base plates fixed with elastic clamps or elastic clip. This type of crossing may be supplied with the running surfaces explosive hardened.

Benefits & Use

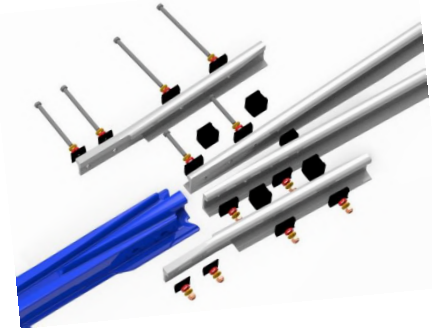
- Suitable for tracks of high operation load (main transit corridors)
- Explosive hardening significantly lowers the maintenance requirements and extends the service life



SHORTENED MONOBLOCK CROSSING - BAINITIC STEEL

Common crossing with shortened monoblock casting flash-butt welded with connecting rails.

The casting is from bainitic steel. The connecting rails are of profile 60E1, 60E2, of quality R260 or higher. The connecting rails are welded to the tip with a longitudinal weld on the head and the foot. The wing rails in the area of wheel passage are casted, other part of the wing rails are the rails fixed with high-strength bolts. The crossing is placed on ribbed base plates fixed with elastic clamps or elastic clips.



Benefits & Use

- Suitable for tracks of high operation load (main transit corridors)
- Low maintenance cost
- High wear resistance
- Long service life



swing nose crossings

SWING NOSE CROSSING WITH ASSEMBLED PIECES

Swing nose crossing is made of extended wing rails, which are completed with point studs. In the back part, the wing rails are firmly connected with the immovable part of the swing nose to ensure capturing of the forces from the continuous welded rail track. The swing nose is assembled from switch rails, there is a rail expansion joint at the back.

Benefits & Use

- Suitable for tracks of high operation load (main transit corridors)
- Simple design of the swing nose
- Smooth wheel passage thanks to continuous running edge
- Reduced dynamic effect while passing of the railway vehicles
- Long service life



SWING NOSE CROSSING WITH WELDED FRAME

Swing nose crossing consists of welded frame, which is connected to the shortened wing rails behind the area of the wheel passage to the point. The frame is completed with the studs. In the back part, the frame is firmly connected with the immovable part of the swing nose to ensure capturing of the forces from the continuous welded rail track. The swing nose is assembled from switch rails, there is a rail expansion joint at the back.

Benefits & Use

- Suitable for tracks of high operation load (main transit corridors)
- Smooth wheel passage thanks to continuous running edge
- Reduced dynamic effect while passing of the railway vehicles
- Long service life



swing nose crossings

SWING NOSE CROSSING WITH CASTED FRAME

Swing nose crossing consists of manganese steel casting or bainitic steel casting (min hardness 350 HB). Running rails are welded to the frame in front of the crossing, wing rails are welded to the frame behind the crossing. The wing rails are completed with the studs. In the back part, the frame is firmly connected with the immovable part of the swing nose to ensure capturing of the forces from the continuous welded rail track. The swing nose is assembled from switch rails.

Benefits & Use

- Suitable for tracks of high operation load (main transit corridors) and high axle load (heavy duty tracks)
- Compact and robust design
- Smooth wheel passage thanks to continuous running edge
- Reduced dynamic effect while passing of the railway vehicles
- Long service life



CROSSING WITH HARDENED FORGED NOSE AND ASSEMBLED PIECES

Swing nose crossing is made of extended wing rails, which are completed with point studs. In the back part, the wing rails are firmly connected with the immovable part of the swing nose. Point rails are welded to the hardened forged nose.

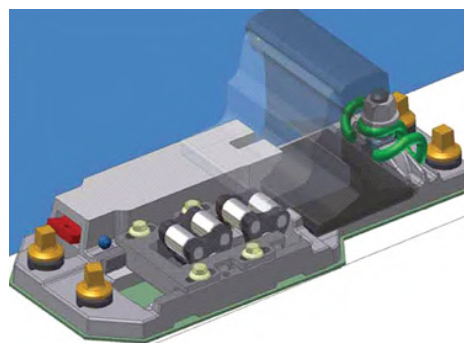
Benefits & Use

- Cheapest swing nose crossing
- Suitable for tracks of medium operation load (subways, light rails)
- Smooth wheel passage thanks to continuous running edge
- Reduced dynamic effect while passing of the railway vehicles
- Long service life

roller chairs

INTEGRATED ROLLER CHAIRS

The device is used to lift the switch rails above the sliding surfaces of the sliding chairs during the operation, which eliminates the necessity of lubrication. In the working position, the switch rails is placed on the sliding surfaces, during the operation and in the distant position of the switch rail the switch rail is placed on the roller of the roller chairs. The chairs are designed as a casting or a weld.



Use

- New turnouts without inclination or with inclination 1:40
- Superstructure UIC 60, S 49

Benefits

- Elimination of the need for sliding chairs lubrication
- Reduction of the operational resistance
- Extending the service life operational mechanism components
- Low maintenance cost
- Eco-friendly service

ROLLER CHAIRS installed between sleepers

The device is used to lift the switch rails above the sliding surfaces of the sliding chairs during the operation, which eliminates the necessity of lubrication. In the working position, the switch rails is placed on the sliding surfaces, during the operation and in the distant position of the switch rail the switch rail is placed on the roller of the roller chairs. It is possible to install them between the sleepers in the existing turnouts without any traffic restrictions. The placement and the number of the chairs depends on the turnout geometry.

| | |
|--------------|---|
| Profile | UIC 60, S 49, R 65 |
| Max speed | 160 km/h |
| Geometry | no limitation |
| Installation | between the sleepers |
| Weight | ca.18 kg |
| Dimensions | length: 500 mm, width: 130 mm, height: 100 mm |

Use

- New or existing turnouts for railway tracks, industrial railway siding and gravity yard
- Superstructure UIC 60, S 49

Benefits

- Elimination of the need for sliding chairs lubrication
- Reduction of the operational resistance
- Extending the service life operational mechanism components
- Low maintenance cost
- Eco-friendly service
- **Possibility of additional installation into existing turnouts**

increasing of the switch rail resistance

Description

The principle of the increasing of the switch rail resistance consists in increased diagonal section of the switch rail on the running edge in the area of wheel passage from the stock rail to the switch rail. There are two basic methods of increasing the switch rail resistance:

1. **The diagonal section is carried out towards the stock rail.** The way of stock rail machining along the whole length of the switch rail should then correspond with this type of switch rail machining.
2. **The increased resistance is carried out across the theoretical running edge.** This method is enabled to the exclusion of the extension of the gauge in the turnout.



Switch rail with increased resistance in the track

Benefits

- Longer service life
- Increased resistance against chipping and crumbling of the tip of the switch rail
- Reduced maintenance costs

heat treatment of the rails

Description

Pearlitisation is a technology consisting in rail head heat treatment, when fine pearlite structure of required parameters is reached. The whole process consists in controlled induction heating to austenization temperature, keeping this temperature for a certain time, followed by controlled cooling.

The result of the pearlitisation process

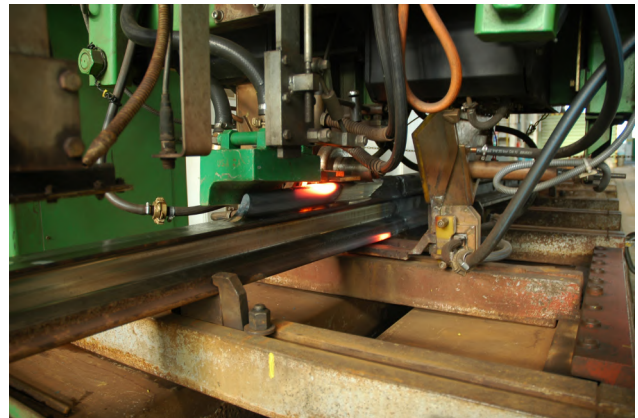
- Fine pearlite structure
- Depth of hardened layer in the vertical direction of min 15 mm
- Surface hardness 350 – 390 HB, 15 mm under the surface of min 300 HV 30
- Tensile strength min 1160 MPa
- Pearlitised layer elongation is min 9% (assuming that the basic material elongation before pearlitisation equals to min 12%)

Use

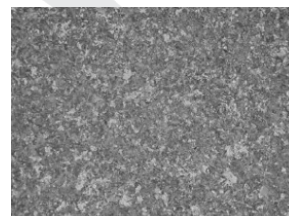
- Turnouts for tracks of high operation load (national and regional tracks)
- Turnouts run mostly in one direction
- Curved turnouts – outer design

Benefits

- Longer service life
- Increased resistance against wear and cracking (min 1,5 times compared to the parts with no heat treatment)
- Increased resistance against chipping, crumbling, lipping and other defects
- Reduced maintenance costs



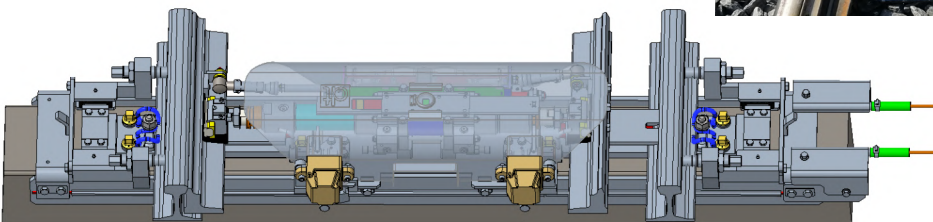
The microstructure **before** and **after** pearlitisation process



DTZ locking device

Description

- DTZ locking device (DTZ1 – DTZ6) is used for mechanical operation of the switch rails in standard railway systems with gauge 1435 mm up to the speed 350 km/h depending on the design and customer's requirements
- The modular design of the locking device enables creation of multi-locking systems of switches and movable nose by sequential connecting of other locking devices
- It enables automatic operation of the switch as well as manual operation using the handle, alternatively emergency manual operation and its mechanical locking in extreme positions
- Mechanical locks of the cylinders work in the oil filling, securing long service life and high reliability
- The hydraulic drive enables effective, highly efficient and quiet transmission of the hydroaggregate power, from one central location as for the multi-locking device
- The device(s) is installed on one concrete or wooden sleeper and does not significantly exceed its width – therefore the ballast tamping is easy to be carried out
- The setting force is continuously adjustable within a wide range using a single adjustable element – relief valve
- The locking device secures a non-destructive cut of the turnout with speed max 40 km/h
- The firm bond between the switch rail and the stock rail consists of movable frame
- The device is characterized by great strengthening force of the switch rail to the stock rail
- High stability of the locking test
- The device is equipped with an easily accessible visual indication of the mechanical locking status
- Modular design with possibility of quick repairs by exchanging the identical devices



DTZ locking device

Technical description

| | | |
|-----------------------|---|---|
| Technical description | Rail profiles | UIC60, R65 |
| | Max speed of passage | 250 km/h (DTZ1), 350 km/h (DTZ6) |
| | Voltage | 3 x 400 V AC / IT, 50Hz |
| | Power input | 550 W (DTZ1) – 2 200 W (DTZ6) / 1 420 – 935 rev. min ⁻¹ (depending on the number of locking device) |
| | Operation force | continuously adjustable up to 7000 N according to the customer's requirement |
| | Time of mechanical operation | 2 s (DTZ1) – 6 s (DTZ6) depending on the opening of the switch rail and customer's requirement for the force |
| | Time of manual operation | up to 60 s (DTZ1) – 180 s (DTZ6) at ca. 60-100 r.p.m. of the handle |
| | Point mechanism operation throw | 80 - 170 mm, firmly set during manufacturing according to the customer's requirement |
| | Switch rail expansion joint | ± 35 mm from basic position |
| | Parting force | 8000 - 9000 N |
| | Locking | mechanical locks with mechanical locking and mechanical sensors |
| | Mechanical locking | Fp > 50 000 N (switch point locking to the stock rail) |
| | Covering | electric motor IP 55, switchboard (including terminal boards) IP66 and sensors IP 67 |
| | Hydraulic pressure | working 2 - 4 MPa , transferring 5,5 MPa, for drawing the operating force ca. 7 100 N |
| | Oil filling | oil Aeroshell 41 Fluid, Shell Tellus T 15, PLANTOHYD 22 S (FUCHS) |
| | Temperature range | -35°C – +60°C |
| Service life | 25 years or 2 mil operation carried out | |

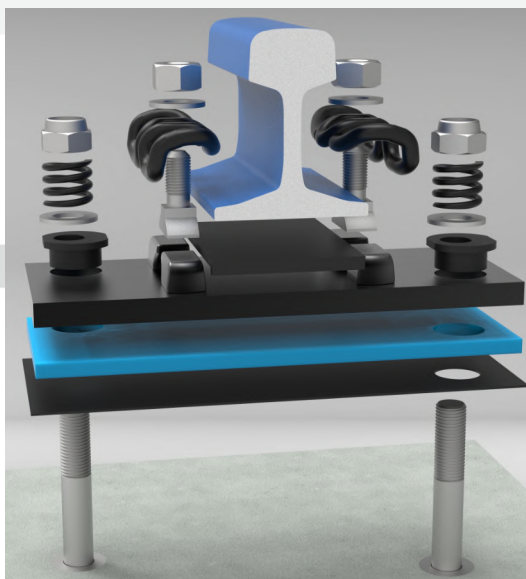
fastening system DTFS-2540

| | | |
|-----------------------|----------------------------------|--|
| Technical description | Axle load | ≤ 26 t |
| | Type of rail | Any flat bottomed rail |
| | Fastening system stiffness | From 20 kN/mm to 40 kN/mm |
| | Superstructure type | Slab track. System: top-down or bottom-up |
| | Turnout geometry | Any common S&C structures |
| | Maximal speed | ≤ 250 km/h |
| | Curve radius | ≥ 150 m for conventional rail ≥ 80 m for urban rail ≥ 40 m for tramway rail |
| | Adjusting of horizontal position | -5 mm to +5 mm |
| | Adjusting of height | -2 mm to +40 mm |
| | System approval / homologation | EN 13481-5:2023 |

Technical description

The fastening system DTFS-2540 is designed to fasten the switch panel, the closure panel and the crossing panel of the turnout to the slab track support element for both top-down and bottom-up system and for axle load max 13 t (category A), max 18 t (category B) and max 26 t (category C) according to EN 13481-5.

Modification of the fastening system according the customer's requirements is possible.



Use

- conventional railways
- urban rail (tramways, LRT, metro systems)

